No. 200600116

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Rutgers, The State University of New Jersey

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR [illegible]TING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE [illegible]URPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT [illegible]BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) S[illegible]OLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMB[illegible]ERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

FESCUE, HARD

'Firefly'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of Washington, D.C. this seventh day of February, [illegible] the year two thousand and eight.*

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secre[illegible]iculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Rutgers, The State University of New Jersey, ~~c/o Dr. William Meyer~~
(BT: 8/4/2006)

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
SPM

3. VARIETY NAME
Firefly

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Foran Hall
Plant Biology & Pathology Dept.
59 Dudley Road
New Brunswick, NJ
08901

5. TELEPHONE *(Include area code)*
(732) 932-9711

6. FAX *(Include area code)*
(732) 932-9441

FOR OFFICIAL USE ONLY

PVPO NUMBER
200600116

FILING DATE
2/27/2006

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Government Institution

8. IF INCORPORATED, GIVE STATE OF INCORPORATION

9. DATE OF INCORPORATION

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
Dr. William Meyer
c/o Rutgers University
Foran Hall
Plant Biology & Pathology Dept. 59 Dudley Road
New Brunswick, NJ
08901
(BT: 8/4/2006)

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ ~~4,382~~
DATE 2/27/2006

CERTIFICATION FEE:
$ 768.00
DATE 12/18/2007

11. TELEPHONE *(Include area code)*
(732) 932-9711

12. FAX *(Include area code)*
(732) 932-9441

13. E-MAIL

14. CROP KIND *(Common Name)*
Hard Fescue

16. FAMILY NAME *(Botanical)*
Poaceae

15. GENUS AND SPECIES NAME OF CROP
Festuca longifolia

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☑ NO

18. DOES THE VARIETY CONTAIN ANY TRANSGENES? *(OPTIONAL)*
☐ YES ☑ NO
IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERICALIZATION. _____

19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
(Follow instructions on reverse)

a. ☑ Exhibit A. Origin and Breeding History of the Variety
b. ☑ Exhibit B. Statement of Distinctness
c. ☑ Exhibit C. Objective Description of Variety
d. ☑ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☑ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☑ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☑ Filing and Examination Fee ($3,652), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
☑ YES *(If "yes", answer items 21 and 22 below)* ☐ NO *(If "no", go to item 23)*

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES?
☑ YES ☐ NO
(BT: 10/29/2007 per applicant's authorization)
IF YES, WHICH CLASSES? ☑ FOUNDATION ☑ REGISTERED ☑ CERTIFIED

22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☑ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☐ YES ☑ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☑ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
NAME *(Please print or type)*		NAME *(Please print or type)*	
Daniel Rossi		STEVEN P. TUBBS	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Sr. Assoc. Dean	1/13/06	PRESIDENT	02/05/06

(See reverse for instructions and information collection burden statement)

ST-470 (04-03) designed by the Plant Variety Protection Office using Word 2002.

Exhibit A:

Origin and Breeding History
Firefly Hard Fescue

1. Firefly hard fescue (*Festuca longifolia* Thluill.) is an advanced generation synthetic cultivar selected from the maternal progenies of 39 clones. Three closely related clones served as additional pollen sources. Firefly was developed for improved seed yield performance, dark bright green color, freedom from summer patch disease (caused by the fungus *Magnaporthae poae* Landschoot & Jackson) and medium maturity. One hundred percent of the parental germplasm in Firefly contain endophyte (*Epichloe festucae* [Schardle]). Approximately eight percent of their parental germplasm trace to a plant selected from Old Bridge Cemetery, in Old Bridge, NJ. Approximately 72 percent trace to plants selected from or related to the cultivar Reliant (Duell, et al., 1983). The other 20 percent trace to selections from old low maintenance turfs of the eastern United States.

The breeding method used in the development of Firefly hard fescue was a population improvement program involving the evaluation of collected germplasm followed by cycles of recurrent phenotypic and genotypic selection. The population improvement program was initiated in 1968 at Rutgers University to improve pest resistance, stress tolerance, attractiveness, turf performance, seed yield and the ability to provide an acceptable turf cover without the need for supplemental fertilization or irrigation. The breeding program included extensive germplasm collection and evaluation of the most promising genetic material from old turfs. Most of the promising selections were made in old cemeteries in northern and central NJ; Atlanta, GA and Baltimore, MD; golf course roughs in NJ and NY and lawns of Cook, Douglas and Rutgers Colleges of Rutgers University, New Brunsweick, NJ. The breeding program also included: intercrossing the most attractive plants, screening their progenies (over 50,000) for resistance to powdery mildew (*Erysiphe graminis* DC), leaf spot (*Dreschlera dictyoides* Shoemaker) and an attractive turf-type growth habit under greenhouse conditions, evaluating these selected seedlings (over 12,000 individuals) in isolated spaced-plants from these nurseries at either Adelphia or North Brunswick, NJ, removing the least attractive plants from these nurseries prior to anthesis, harvesting seed from the most attractive pest resistant plants with the best floret fertility, seeding over 1,000 single-plant progenies in closely mowed turf trials, selecting attractive plants from the best performing progenies which contained endophyte, and repeating the above procedures in a continuing population improvement program to produce Firefly hard fescue.

Following varying cycles of phenotypic and genotypic selection for characteristics such as

dark green color, high shoot density, early seed maturity and freedom from disease, two turf trials were established in the fall of 1995 and 1996. The one established in 1995 contained 150 single-plot progenies and the one established in 1996 contained 175 single-plot progenies. Following five years of plant competition, mowing, and environmental stresses such as drought and summer patch disease, the five best performing turf plots from both the 1995 and 1996 turf trials were selected. One nursery was established in the spring of 2000, which contained 1,800 plants from the progeny of five clones from the 1995 turf trial. This nursery was retained through 2002. A second nursery was established in the spring of 2001, which contained 600 plants from the progeny of five cones from the 1996 turf trial. During the spring of 2002, five plants were chosen from the 200 nursery and 37 plants were chosen from the 2001 nursery for dark bright green color, high shoot density, medium seed maturity and freedom from disease. These selected plants were moved, prior to anthesis, to an isolated crossing block at Adelphia, NJ. Thirty-nine plants from the six different maternal lines were harvested with excellent floret fertility and freedom from disease. In the fall of 2002, one turf plot of each line was established at Adelphia and 1 gram of each line was sent to Advanta Seeds Pacific for increase and further nursery evaluation.

In the fall of 2002 an increase block of Firefly was established containing 60 plants of each progeny line, for a total of 2,220 plants. In 2003 negative mass selection was used and 0.2% of the plants were rogued from the population. The remaining plants were harvested in bulk and designated 'Firefly' breeder seed. Breeder seed was used to establish a morphological nursery for Plant Variety Protection (PVP) measurements.

Reference

Duel, R.W., R. H. Hurley, F. B. Ledeboer, and C. R. Funk. 1983 Reliant Hard Fescue. Crop Sci. 23(5): 1011 - 1012

2. Breeder Seed Maintenance:
A breeder seed multiplication was planted in isolation in 2002 in Albany, Oregon. Seed was harvested in bulk in 2003 and is maintained in cold storage. Seed propagation is limited to three generations, one each of foundation, registered, and certified.

3. Stability and Uniformity:

Firefly has been a stable uniform cultivar over 2 generations. No off-type or variant plants have been observed during the multiplication or reproduction. During the breeder seed multiplication 0.2 % of the plants were removed. These types were not observed during the subsequent generations. Turf plots of Firefly have been uniform and stable.
(BT: 10/18/2007)

Exhibit B:

Novelty Statement of Firefly Hard Fescue

The following summary outlines the distinctive characteristics of Firefly. The novelty of Firefly is based on the unique combination of these characteristics. Firefly is most similar to Scaldis, but may be differentiated by using the following criteria:

1) The heading date and anthesis date of Firefly is later than Scaldis (tables 1A, 1B).

2) Firefly has a mature plant height at least 93 mm shorter than Scaldis (tables 1A, 1B).

3) The panicle length of Firefly is at least 80 mm shorter than Scaldis (tables 1A, 1B).

4) The flag leaf characteristics; length, height and sheath length are all shorter for Firefly compared to Scaldis (tables 1A, 1B).

5) The leaf blade length and leaf blade sheath length of Firefly are shorter than Scaldis (tables 1A, 1B).

6) Firefly has a shorter lemma length and awn length compared to Scaldis (tables 2A, 2B).

7) Firefly expresses more plants with an oblong panicle shape compared to Scaldis (tables 3A, 3B).

8) Firefly has a higher frequency of plants with an open panicle compared to Scaldis (tables 3A, 3B).

9) Firefly produces fewer plants with a glaborous leaf sheath compared to Scaldis (tables 4A, 4B).

10) Firefly has more seeds per 1,000 mg compared to Scaldis (tables 4A, 4B).

FORM APPROVED: OMB NO. 0581-0055

EXHIBIT C
(Fine Leaved Fescues)

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURE MARKETING SERVICE
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

OBJECTIVE DESCRIPTION OF VARIETY
FINE LEAVED FESCUES
(Festuca spp.)

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Rutgers , The State University of New Jersey ~~c/o Dr. William Meyer~~ (ET:8/4/2006)	SPM	Firefly

ADDRESS *(Street and No. or R.F.D. No., City, State, Zip Code)*
Foran Hall
Plant Biology & Pathology Dept.
59 Dudley Road, New Brunswick, NJ, 08901

FOR OFFICIAL USE ONLY
~~PVPO NUMBER~~ 200600116

~~Place the appropriate number that describes the varietal character of this variety in the boxes~~ below. Use leading zeroes when necessary: (e.g., 0 8 or 0 9). Characteristics described including numerical measurements, should represent those that are typical for the variety. Measured data should be for SPACED PLANTS. Royal Horticulture Society or any recognized color fan may be used to determine plant colors; designate system used: _____
Describe location of test area, conditions and number of plants used: **See section 16, page 4.**

1. SPECIES: (With comparison varieties for use below - use varieties within species of application variety)

____	1 = *F. rubra ssp. commutata* (Chewings)	11 = Cascade 14 = Banner	12 = Highlight 15 = Barfalla	13 = Jamestown
____	2 = *F. rubra ssp. litoralis* (Creeping Red)	21 = Dawson 24 = Pennlawn	22 = Starlight	23 = Merlin
____	3 = *F. rubra ssp rubra* (Spreading Red)	31 = Boreal 34 = Ensylva		
____	4 = *F. ovina* (Sheep)	41 = Covar		
53	5 = *F. longifolia* (Hard)	51 = Durar	52 = Biljart (C-26)	53 = Scaldis
____	6 = *F. tenuifolia* (Fine-Leaved Sheep)	61 = Panda	62 = Barok	
____	7 = Other *(Specify)* F._____			

2. CYTOLOGY:
4 | 2 Chromosome Number 3 Ploidy 1 = diploid 2 = tetraploid 3 = hexaploid 4 = octoploid

3. ADAPTATION: (0 = Not Tested; 1 = Not Adapted; 2 = Adapted)
2 Northeast 0 Southeast 0 North Central 2 Pacific N.W. ____ Other *(Specify)* _____

4. MATURITY: Date First Headed (panicle emergence) Location(s) of Trial(s)_____
4 Maturity Class:
1 = Very Early (Covar) 2 = Early (Highlight) 3 = Medium Early (Boreal, Dawson)
4 = Medium Late (Cascade, Ruby) 5 = Late (Jamestown, Agram) 6 = Very Late

Date Headed 51. 75 days after March 1,

|	Days earlier than	|	Comparison Variety
|	Maturity same as	|	
9.25	Days later than	53	

5. Plant Height: (At maturity; to top of panicle; Average of 10 culms)

549.95	mm height		
93.18	mm shorter than	53	Comparison Variety
	Height same as	|	
| |	mm taller than	|	

6. GROWTH HABIT: (Mature)
2 1 = Erect (Ruby) 2 = Semi-erect (Highlight) 3 = Prostrate (Silvana)

7. RHIZOMES:
\| \| mm Length \| \| mm Width \| \| mm Internode length
1 1 = Absent (Highlight) 2 = Weakly Creeping (Dawson) 3 = Strongly Creeping (Boreal)
4 = Very Strongly Creeping (Fortress)

2006001 16

8. LEAF BLADE:

7 Color: 1 = Light Green (Strarlight) 2 = Medium Light Green (Highlight) 3 = Medium Dark Green (Ruby, Agram) 4 = Dark Green (Jamestown, Manoir) 5 = Bluegreen (Saphir) 6 = Graygreen (Scaldis) 7 = Other (*Specify*) Darker green than Jamestown

1 Glaucosity (Sowing Year): 1 = Absent (Koket) 2 = Present (Vendrome)

1 Anthocyanin: 1 = Absent 2 = Present

2 Hairs (Basal) 1 = Absent 2 = Present

1 Margins: 1 = Smooth 2 = Semi-rough 3 = Rough

1 Margin folding (closure): 1 = Rolled inward (closed-Highlight) 2 = Flat (open-Jamestown, Engina)

3 Width class: 1 = Very Fine (Agram, Frida) 2 = Fine (Jamestown, Highlight, Banner, Dawson) 3 = Medium Fine (Fortress, Ruby, Scaldis) 4 = Medium Coarse (Engina)

223.85 mm Length (flag leaf)

28.80 mm Shorter than 53

Blade length same as . . . . . |

| mm Longer than . . . . . |

} Comparison Variety

| mm Width (flag leaf)

▲ | mm Narrower than . . . . . |

Blade width same as 53

▲ | mm Wider than . . . . . |

} Comparison Variety

9. LEAF SHEATH:

1 Anthocyanin (seedling): 1 = Absent (Highlight) 2 = Present (Jamestown, Fortress, Marga)

2 Auricle Hairiness: 1 = Absent 2 = Present (<5%)

1 Margins: 1 = Open (Highlight) 2 = Closed (Jamestown)

10. PANICLE (Mature plant):

3 Shape: 1 = Narrow-tapering 2 = Ovate 3 = Oblong 4 = Other (*Specify*) _____

1 Type: 1 = Open 2 = Intermediate 3 = Compact

1 Orientation: 1 = Erect 2 = Nodding

2 Branch Pubescence: 1 = Glabrous 2 = Pubescent

4 Anther Color:

2 Glume Color (At 50% flowering):

} 1 = Yellowish Green 2 = Green 3 = Bluish Green 4 = Purplish 5 = Reddish 6 = Other (*Specify*) _____

474.18 mm Length

80.02 mm Shorter than 53

Panicle length same as . . . . . |

| mm Longer than . . . . . |

} Comparison Variety

11. PALEA:

2 Hairs (On keels or margins): 1 = Absent (Banner) 2 = (Agram, Scaldis, Olds) short 3 = Long (Ranier, Fortress, Jamestown) (Dt: 8/4/2006)

12. LEMMA (Mature):

2 Hairs: 1 = Absent (Jamestown) 2 = Several 3 = Many (Highlight)

4.75 mm Lemma Length

0.23 mm Shorter than 53

Lemma length same as . . . . . |

| mm Longer than . . . . . |

Comparison Variety

0.93 mm Lemma Width

| | mm Narrower than . . . . . |

Lemma width same as 53

| | mm Wider than . . . . . |

Comparison Variety

2 Awns: 1 = Absent 2 = Present

2.13 mm Awn Length

0.35 mm Shorter than 53

Awn length same as . . . . . |

| mm Longer than . . . . . |

Comparison Variety

13. SEED (With lemma & palea):

2 Size Class (g/1000 seed):
1 = <.9g (Biljart, Dawson) 2 = .91-< 1.1g (Jamestown, Highlight)
3 = 1.1 - 1.3 g (Fortress, Novorubra) 4 = > 1.3g (Boreal, Golfrood)

1,055.00 mg per 1000 seed

| | | mg per 1000 seed less than . . . . . |

Seed Weight same as . . . . . |

237.00 mg per 1000 more than 53

Comparison Variety

14. DISEASE, INSECT, AND NEMATODE REACTION (0 = Not Tested, 1 = Susceptible, 2 = Resistant):

0	Melting-out *Drechslera poae* (*Helminthosporium vagans*)	0	Stripe rust *P. striiformis*
0	Leaf spot *D. siccans*	0	Leaf rust *P. poae-nemoralis*
0	Net blotch *D.* dictyoides	0	*P. crandalli*
0	Leaf spot *Bipolaris sorkiniana*	0	Pythium Blight *Pythium ultimum*
0	Brown patch *Rhizoctonia solani*	0	Red thread *Corticum fusciforme*
0	Powdery Mildew *Erysiphe graminis*	0	Dollar spot *Sclerotinia homoeocarpa*
0	Stripe smut *Ustilago striiformis*	0	Insect _____
0	F. Patch, Pink snow-mold *Fusarium nivale*	0	Nematode _____
0	Fusarium blight *F. tricinctum, F. roseum*	0	Other _____
0	Gray snow mold *Typhula iotana*	0	Other _____
0	Stem rust *Puccinia graminis*	0	Other _____

15. GIVE VARIETY OR VARIETIES THAT MOST CLOSELY RESEMBLE THE APPLICATION VARIETY. For the following characteristics indicate Degree of Resemblance by placing the column marked, D. R., 1 of the following numbers:

200600116

1 = Application variety is less than comparison variety. 2 = Same As
3 = More than, better, greater, darker, more disease resistant, etc.

CHARACTER	VARIETY	D. R.	CHARACTER	VARIETY	D.R.
Rhizome Length	Scaldis	2	Growth Habit	Scaldis	2
Leaf Width	Scaldis	2	Leaf Color	Scaldis	3
Panicle Color	Scaldis	1	Panicle Shape	Scaldis	3
Winter Color	Scaldis	2	Cold Injury	Scaldis	2
Shade Tolerance	Scaldis	2	Heat	Scaldis	2
Drought	Scaldis	2	Disease*	Scaldis	2

* *Specify each disease evaluated.*

16. ADDITIONAL DESCRIPTION: (Use additional sheets as required)
Describe all characteristics that cannot be adequately described in the form above in Exhibit D. Comparative varieties should be used as may be appropriate, such as for disease. Append all comparative trial and evaluation data, including measured characters, environmental, and disease test.

A morphological nursery designated 03PVPFRR was established in September 2003, in Albany, Oregon. Experimental design consisted of 5 entries; 4 replications per entry; 20 plants per replication; for a total of 80 plants per entry. Biljart, SR 3000, and Scaldis were used as standards. Plants were established on 2.5 foot centers with a skip row between replications and between entries.

The nursery received 30 pounds of nitrogen per acre rate following establishment and 50 pounds of nitrogen per acre per year in 2004 and 2005. The fertilizer source was 15 - 15 - 15 and was applied as a split application with ½ applied in the spring and ½ in the autumn. The nursery was sprayed twice each spring, 3 weeks between applications, with Quilt (2oz/acre rate), to prevent stem rust. One pound of Karmex per acre rate was applied during the late summer to prevent emergence of volunteer seedlings.

Data was analyzed using analysis of variance for a randomized complete block design. Means were calculated for each replication and then analyzed for tables 1A, 1B, 2A, and 2B.

Tables 3A, 3B, 4A, 4B, 5A, and 5B data were analyzed using binary data confidence intervals. The confidence intervals are given for the characteristics which expressed significant differences.

Exhibit D:

Additional Description

Firefly Hard Fescue

Firefly has improved characteristics over current cultivars, such as Scaldis. The heading date and anthesis date of Firefly is later compared to Scaldis, Biljart and SR 3000 (tables 1A, 1B). Firefly is a more compact cultivar compared to Scaldis (tables 1A, 1B) with the mature plant height shorter than Scaldis and SR 3000. The panicle length of Firefly is also reduced compared to Scaldis, Biljart, and SR 3000 (tables 1A, 1B). The glume length of Firefly is longer compared to Biljart (tables 2A, 2B). The length of the longest branch of the lower most whorl is shorter for Firefly compared to Scaldis, Biljart, and SR 3000 (tables 2A, 2B).

Firefly may be differentiated from Scaldis on several visual characteristics. Firefly exhibits a lower frequency of plants with a nodding panicle orientation compared to SR 3000 (tables 3A, 3B). Firefly exhibits a higher frequency of plants with an oblong panicle shape and an open panicle type compared to Scaldis, Biljart, and SR 3000 (tables 3A, 3B). The frequency of glabrous leaf sheath surface hairs is less for Firefly than Scaldis and SR 3000 (tables 4A, 4B). Firefly produces more plants with a distinct node pigmentation compared to Biljart (tables 4A, 4B). The weight of 1,000 seeds of Firefly is greater than Biljart and Scaldis (tables 4A, 4B). Firefly performs better in turf compared to Jamestown II, Reliant II, Minotaur, and Stonehenge (table 6).

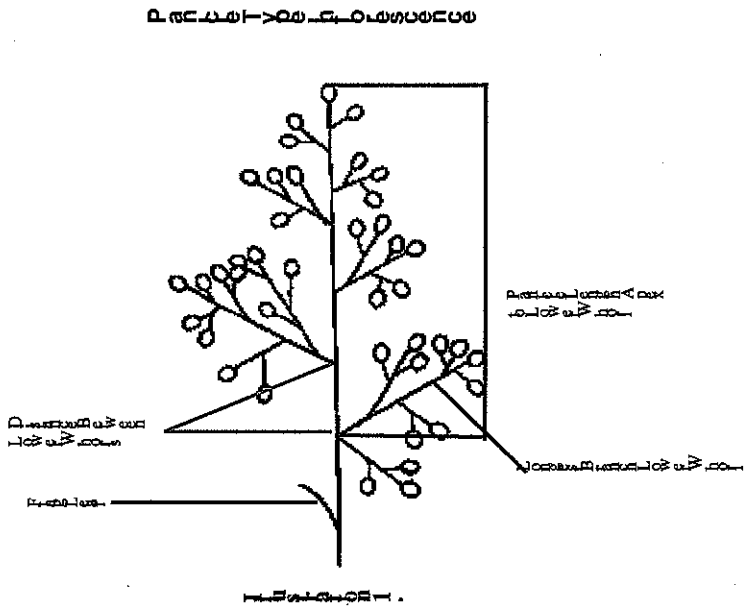

Table 1A 2004 Morphological Data

Cultivar	Heading Date days after March 1	Anthesis Date days after April 1	Genetic Color	Mature Plant Height (mm)	Plant Width (mm)	Panicle Length (mm)	Flag Leaf Length (mm)	Flag Leaf Height (mm)	Flag Leaf Sheath Length (mm)	Flag Leaf Internode Length (mm)	Leaf Blade Length (mm)	Leaf Blade Height (mm)	Leaf Sheath Length (mm)
Firefly	50.00	54.25	6.00	549.95	142.28	474.18	223.85	235.70	150.15	80.48	167.05	78.95	85.60
Scaldis	43.75	50.25	5.75	643.13	146.45	554.20	252.65	259.35	173.15	89.30	197.28	91.08	98.15
Biljart	46.50	51.25	5.75	564.15	154.33	503.98	230.65	230.10	157.45	71.90	161.40	80.70	86.53
SR 3000	43.75	49.25	6.00	648.33	160.25	569.70	255.93	248.90	172.65	82.03	188.33	84.40	96.40
LSD 5%	1.79	1.84	0.41	28.16	9.35	18.41	10.44	18.01	8.90	10.46	8.86	12.33	5.88
C.V.	3.15	2.89	5.58	3.71	4.85	2.78	3.44	5.85	4.29	10.32	3.94	11.71	5.05

■ Cultivar under evaluation
■ Significant difference over one location two years.
■ Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points

Table 1B 2005 Morphological Data

Cultivar	Heading Date days after March 1	Anthesis Date days after April 1	Genetic Color	Mature Plant Height (mm)	Plant Width (mm)	Panicle Length (mm)	Flag Leaf Length (mm)	Flag Leaf Height (mm)	Flag Leaf Sheath Length (mm)	Flag Leaf Internode Length (mm)	Leaf Blade Length (mm)	Leaf Blade Height (mm)	Leaf Sheath Length (mm)
Firefly	51.75	57.00	5.50	676.15	252.83	528.38	240.55	295.70	150.03	101.03	188.45	119.90	83.68
Scaldis	42.50	54.50	5.00	773.60	263.53	632.30	277.33	332.95	182.45	109.30	218.90	135.58	103.28
Biljart	46.50	54.50	5.00	686.23	278.70	558.45	239.35	283.63	159.20	94.03	177.80	113.03	81.53
SR 3000	42.25	54.25	5.00	735.53	272.23	589.90	253.15	311.68	173.43	104.65	196.53	120.10	101.55
LSD 5%	5.15	1.21	0.33	16.54	12.89	18.56	13.79	18.74	8.53	7.86	11.76	15.22	4.63
C.V.	9.17	1.75	4.87	1.86	3.84	2.58	4.41	4.99	4.11	6.34	4.82	10.09	4.03

■ Cultivar under evaluation
■ Significant difference over one location two years.
■ Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points

Table 2A 2004 Laboratory Morphological Data

Cultivar	Lemma Length (mm)	Lemma Width (mm)	Lemma Awn Length (mm)	Glume Length (mm)	Florets per Spikelet	Spikelet Length (mm)	Length of Longest Whorl (mm)	Distance Between Lower Most Whorls (mm)	Number of Spikelets on the Longest Whorl	Spikelets per Panicle	Length of Panicle from Lower Most Whorl to Tip (mm)
Firefly	4.93	1.03	2.30	4.65	6.00	10.75	50.65	33.08	8.75	35.75	109.18
Scaldis	5.20	1.00	2.75	4.88	6.50	11.48	60.05	40.18	9.50	33.50	128.80
Biljart	4.80	0.93	2.33	4.20	6.00	10.13	61.15	37.70	10.50	40.00	123.13
SR 3000	4.95	1.00	2.70	4.83	6.75	11.20	57.50	40.15	9.00	36.75	128.88
LSD 5%	0.25	0.12	0.29	0.29	0.59	0.55	3.33	3.93	1.35	3.35	7.84
C.V.	3.95	9.75	9.26	4.94	7.33	4.05	4.55	8.28	11.02	7.06	5.04

■ Cultivar under evaluation
▒ Significant difference over one location two years.
▒ Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points

Table 2B 2005 Laboratory Morphological Data

Cultivar	Lemma Length (mm)	Lemma Width (mm)	Lemma Awn Length (mm)	Glume Length (mm)	Florets per Spikelet	Spikelet Length (mm)	Length of Longest Whorl (mm)	Distance Between Lower Most Whorls (mm)	Number of Spikelets on the Longest Whorl	Spikelets per Panicle	Length of Panicle from Lower Most Whorl to Tip (mm)
Firefly	4.75	0.93	2.13	4.48	4.75	8.08	42.38	30.55	6.75	30.75	101.20
Scaldis	4.98	0.90	2.48	4.75	5.25	8.80	51.35	39.05	8.00	34.00	129.20
Biljart	4.80	0.90	1.98	4.20	4.75	7.83	49.98	32.83	8.25	33.75	109.80
SR 3000	4.90	0.93	2.43	4.73	5.00	8.15	50.98	38.13	8.25	32.75	124.33
LSD 5%	0.14	0.07	0.16	0.20	0.61	0.37	4.23	3.17	1.48	5.22	9.77
C.V.	2.34	6.10	5.54	3.51	9.86	3.56	6.96	7.25	14.70	12.54	6.74

■ Cultivar under evaluation
▒ Significant difference over one location two years.
▒ Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points

Table 3A

2004 Morphological Measurements of the Panicle

Cultivar	Anther Color % Yellow	Anther Color % Purple	Panicle Color % Red	Glume Color % Purple	Panicle Orientation % Nodding			Panicle Shape % Narrow	Panicle Shape Oblong			Panicle Type % Open			Panicle Type % Compact	Percent Branches of Lower Whorl =1	Percent Branches of Lower Whorl =2	Percent Branches of Lower Whorl >3	Panicle Branch Pubescence % Present
					% Present	Lower CI	Upper CI		% Present	Lower CI	Upper CI	% Present	Lower CI	Upper CI					
Firefly	8	93	34	28	4	0.000	0.083	32	68	0.578	0.782	68	0.680	0.782	32	81	18	1	80
Scaldis	8	93	9	31	6	0.008	0.112	88	12	0.056	0.004	12	0.130	0.204	88	81	17	1	93
Biljart	9	91	44	41	13	0.056	0.204	62	38	0.274	0.486	38	0.380	0.486	62	91	8	1	95
SR 3000	1	99	21	33	20	0.112	0.288	78	22	0.0138	0.322	22	0.230	0.322	78	85	15	0	100
LSD (0.05)																			

■ Cultivar under evaluation
▩ Significant difference over one location two years.
▩ Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points
CI = Confidence Interval

Table 3B

2005 Morphological Measurements of the Panicle

Cultivar	Anther Color % Yellow	Anther Color % Purple	Panicle Color % Red	Glume Color % Purple	Panicle Orientation % Nodding			Panicle Shape % Narrow	Panicle Shape Oblong			Panicle Type % Open			Panicle Type % Compact	Percent Branches of Lower Whorl =1	Percent Branches of Lower Whorl =2	Percent Branches of Lower Whorl >3	Panicle Branch Pubescence % Present
					% Present	Lower CI	Upper CI		% Present	Lower CI	Upper CI	% Present	Lower CI	Upper CI					
Firefly	26	74	60	44	20	0.112	0.288	32	68	0.578	0.182	68	0.578	0.782	32	84	16	0	100
Scaldis	6	94	88	64	61	0.503	0.717	74	26	0.164	0.356	26	0.164	0.356	74	86	13	1	100
Biljart	5	95	71	49	36	0.255	0.465	64	36	0.283	0.497	36	0.283	0.497	64	86	13	1	100
SR 3000	5	95	70	34	50	0.390	0.610	71	29	0.191	0.389	29	0.191	0.389	71	86	14	0	100
LSD (0.05)																			

■ Cultivar under evaluation
▩ Significant difference over one location two years.
▩ Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points
CI = Confidence Interval

Table 4A

2004 Additional Measurements of the Leaf Blade and Seed

Cultivar	Node Color % Distinct			Lemma Hairs % Absent	Lemma Hairs % Several	Lemma Awn % Present	Palea Hairs % Present	Leaf Blade Margin Hairs % Present	Leaf Sheath Auricle Hairs % Present	Leaf Sheath Surface Hairs			Leaf Sheath Collar Hairs % Glaborous	Leaf Blade Surface Hairs			Seed Weight mg per 1,000 seeds
	% Present	Lower CI	Upper CI							% Glaborous	Lower CI	Upper CI		% Glaborous	Lower CI	Upper CI	
Firefly	91	0.847	0.973	20	80	100	100	100	5	9	0.027	0.153	0	4	0.000	0.083	1071
Scaldis	83	0.748	0.912	21	79	100	100	100	4	35	0.245	0.455	0	13	0.056	0.204	739
Biljart	68	0.578	0.782	15	85	100	100	100	4	15	0.072	0.228	3	6	0.008	0.112	846
SR 3000	89	0.821	0.959	14	86	100	100	100	1	38	0.274	0.486	1	19	0.104	0.276	1045
LSD (0.05)																	

Cultivar under evaluation
Significant difference over one location two years.
Significant difference over location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points
CI = Confidence Interval

Table 4B

2005 Additional Measurements of the Leaf Blade and Seed

Cultivar	Node Color % Distinct			Lemma Hairs % Absent	Lemma Hairs % Several	Lemma Awn % Present	Palea Hairs % Present	Leaf Blade Margin Hairs % Present	Leaf Sheath Auricle Hairs % Present	Leaf Sheath Surface Hairs			Leaf Sheath Collar Hairs % Glaborous	Leaf Blade Surface Hairs			Seed Weight mg per 1,000 seeds
	% Present	Lower CI	Upper CI							% Glaborous	Lower CI	Upper CI		% Glaborous	Lower CI	Upper CI	
Firefly	83	0.748	0.912	0	100	100	100	100	0	5	0.002	0.098	0	3	0.000	0.067	1055
Scaldis	73	0.619	0.816	0	100	100	100	100	4	34	0.236	0.444	0	14	0.064	0.216	818
Biljart	39	0.283	0.497	0	100	100	100	100	5	20	0.112	0.288	5	8	0.021	0.139	905
SR 3000	61	0.503	0.717	0	100	100	100	100	1	28	0.182	0.378	0	19	0.104	0.279	1087
LSD (0.05)																	

Cultivar under evaluation
Significant difference over one location two years.
Significant difference over one location one year.
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points
CI = Confidence Interval

Table 5A 2004 Additional Morphological Measurements

Cultivar	Growth Habit at Anthesis % Erect	Growth Habit at Anthesis % Semi-Erect	Growth Habit at Anthesis % Prostrate	Leaf Blade Anthocyanin % Purple	Leaf Blade Margin Folding % Closed	Leaf Sheath Margins % Open	Rhizomes % Present	Spring Growth Habit % Prostrate	Spring Growth Habit % Semi-Erect	Spring Growth Habit % Erect
Firefly	4	90	6	0	100	100	0	0	100	0
Scaldis	6	93	1	0	100	100	0	0	100	0
Biljart	3	94	4	0	100	100	0	0	100	0
SR 3000	5	79	16	0	100	100	0	0	100	0

■ Cultivar under evaluation
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points
CI = Confidence Interval

Table 5B 2005 Additional Morphological Measurements

Cultivar	Growth Habit at Anthesis % Erect	Growth Habit at Anthesis % Semi-Erect	Growth Habit at Anthesis % Prostrate	Leaf Blade Anthocyanin % Purple	Leaf Blade Margin Folding % Closed	Leaf Sheath Margins % Open	Rhizomes % Present	Spring Growth Habit % Prostrate	Spring Growth Habit % Semi-Erect	Spring Growth Habit % Erect
Firefly	0	89	11	0	100	100	0	0	100	0
Scaldis	0	93	8	0	100	100	0	0	100	0
Biljart	0	68	33	0	100	100	0	0	100	0
SR 3000	0	76	24	0	100	100	0	0	100	0

■ Cultivar under evaluation
Measurements taken in Albany, Oregon
4 reps; 20 plants/rep = 80 data points
CI = Confidence Interval

Table 6 Turf Data

Cultivar	2003 Turf Quality	2004 Turf Quality	2004 Dollar Spot	2004 Leaf Spot
Firefly	5.60	6.60	8.30	7.00
Jamestown II	4.50	3.70	2.30	
Reliant II	5.20	5.30	5.00	6.30
Minotaur	4.80	4.90	6.70	
Stonehenge	4.60	4.40	6.70	4.30
LSD (0.05)	0.50	0.60	2.70	1.60

(ex: 10/18/02)

Cultivar under evaluation

Significant difference over two years one location.

Significant difference over one year one location.

Measurements taken in Adelphia, New Jersey, Rutgers University

Data taken from Rutgers 2003 Turfgrass Proceedings; table 1, page 50-54

Turf data collected in a 1-9 scale; 9=best

REPRODUCE LOCALLY. Include form number and edition date on all reproductions. FORM APPROVED - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (*7 U.S.C. 2421*). The information is held confidential until the certificate is issued (*7 U.S.C. 2426*).

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Rutgers, The State University of New Jersey ~~c/o Dr. William Meyer~~ (ET: 8/2/2006)	SPM	Firefly
4. ADDRESS (*Street and No., or R.F.D. No., City, State, and Zip, and Country*)	**5. TELEPHONE** (*Include area code*)	**6. FAX** (*Include area code*)
Foran Hall Plant Biology & Pathology Dept. 59 Dudley Road, New Brunswick, NJ 08901	732 - 932 - 9711 ext 160	732 - 932 - 9441
	7. PVPO NUMBER 200600116	

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.**

☒ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country.**

☒ YES ☐ NO

10. Is the applicant the original owner? **If no, please answer <u>one</u> of the following:**

☒ YES ☐ NO

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☒ YES ☐ NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☒ YES ☐ NO **If no, give name of country**

11. Additional explanation on ownership *(If needed, use the reverse for extra space)*:

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

ST-470-E (04-03) designed by the Plant Variety Protection Office using Word 2000.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT F
DECLARATION REGARDING DEPOSIT

NAME OF OWNER (S)	ADDRESS *(Street and No. or RD No., City, State, and Zip Code and Country)*	TEMPORARY OR EXPERIMENTAL DESIGNATION
Rutgers, The State University of New Jersey	Foran Hall Plant Biology & Pathology Dept. 59 Dudley Road New Brunswick, NJ 08901	SPM **VARIETY NAME** Firefly
NAME OF OWNER REPRESENTATIVE (S)	**ADDRESS *(Street and No. or RD No., City, State, and Zip Code and Country)***	**FOR OFFICIAL USE ONLY**
Dr. William Meyer	Foran Hall Plant Biology & Pathology Dept. 59 Dudley Road New Brunswick, NJ 08901	**PVPO NUMBER** #200600116

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.

W C Meyer 10-12-07

Signature Date